

**REMEDIAL INVESTIGATION
PHOTOGRAPH ALBUM
OPERABLE UNIT NO. 9 (SITE 65)**

**MARINE CORPS BASE,
CAMP LEJEUNE, NORTH CAROLINA**

CONTRACT TASK ORDER 0312

JULY 20, 1995

Prepared For:

**DEPARTMENT OF THE NAVY
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NAVAL FACILITIES
ENGINEERING COMMAND
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LIST OF ACRONYMS AND ABBREVIATIONS

Baker	Baker Environmental, Inc.
bgs	below ground surface
BOD	biological oxygen demand
CADD	Computer-Aided Design Drafting
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLP	Contract Laboratory Program
COD	chemical oxygen demand
DoN	Department of the Navy
FFA	Federal Facilities Agreement
gpm	gallons per minute
GSRA	Greater Sandy Run Area
IAS	Initial Assessment Study
LANTDIV	Naval Facilities Engineering Command, Atlantic Division
MCB	Marine Corps Base
msl	mean sea level
NC DEHNR	North Carolina Department of Environment, Health, and Natural Resources
NCSPCS	North Carolina State Plane Coordinate System
NPL	National Priorities List
NTU	Nephelometric Turbidity Units
NUS	NUS Corporation
OU	operable unit
POL	petroleum, oil, and lubricant
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
SI	site inspection
TAL	Target Analyte List
TCL	Target Compound List
TDS	total dissolved solids

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued)

TKN	total kjeldahl nitrogen
TOC	total organic carbon
TPH	total petroleum hydrocarbon
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WAR	Water and Air Research, Inc.

1.0 INTRODUCTION

Marine Corps Base (MCB), Camp Lejeune was placed on the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) National Priorities List (NPL) effective November 4, 1989 (54 Federal Register 41015, October 4, 1989). Subsequent to this listing, the United States Environmental Protection Agency (USEPA) Region IV, the North Carolina Department of Environment, Health, and Natural Resources (NC DEHNR), and the United States Department of the Navy (DoN) and Marine Corps entered into a Federal Facilities Agreement (FFA) for MCB, Camp Lejeune. The primary purpose of the FFA is to ensure that environmental impacts associated with past and present activities at the MCB are thoroughly investigated, and that appropriate CERCLA and Resource Conservation Recovery Act (RCRA) responses are developed and implemented as necessary to protect the public health and welfare and the environment (MCB, Camp Lejeune FFA, 1989).

The scope of the FFA includes the implementation of a remedial investigation/feasibility study (RI/FS) at fourteen Operable Units (OUs) and twenty-seven sites across MCB, Camp Lejeune. OU No. 9 consists of Site 65 (Engineer Dump Area) and Site 73 (Amphibious Vehicle Maintenance Area). This Remedial Investigation (RI) Photograph Album illustrates the RI field activities conducted at Site 65. Field activities conducted at Site 73 are presented in a separate Remedial Investigation Photograph Album specific to that site.

1.1 Location and Setting

MCB, Camp Lejeune is located in Onslow County, North Carolina, approximately 45 miles south of New Bern and 47 miles north of Wilmington. The facility covers approximately 236 square miles including the recent acquisition of approximately 64 square miles west of the facility within the Greater Sandy Run Area (GSRA) of the county. The military reservation is bisected by the New River, which flows in a southeasterly direction and forms a large estuary before entering the Atlantic Ocean.

The eastern and southern border of MCB, Camp Lejeune is the Atlantic shoreline. The western and northern boundaries are U.S. Route 17 and State Route 24, respectively. The City of Jacksonville, North Carolina, borders MCB, Camp Lejeune to the north. MCB, Camp Lejeune is depicted in Figure 1-1.

Construction of MCB, Camp Lejeune began in 1941 with the objective of developing the "World's Most Complete Amphibious Training Base." Construction of the base started at Hadnot Point, where the major functions of the base are centered. Development at Camp Lejeune is primarily in five geographical locations under the jurisdiction of the Base Command. These areas include Camp Geiger, Montford Point, Courthouse Bay, Mainside, and the Rifle Range Area. Site 65 is located in Courthouse Bay.

Courthouse Bay is located on one of a series of small bays which are part of the New River estuary. This area is used for maintenance, storage and training associated with amphibious vehicles and heavy engineering equipment. The Engineering School, also located here, conducts training activities in the large open area located to the southeast of Courthouse Bay.

1.2 Purpose and Format of the Remedial Investigation Photograph Album

The purpose of this photographic album is to provide the DoN and Marine Corps with a visual understanding of Site 65 and a brief overview of the RI field activities. The objective of the RI is to evaluate the nature and extent of the threat or potential threat to public health and welfare or to the environment caused by the release or threatened release of hazardous substances, pollutants, contaminants, or constituents at the site. It is also to establish requirements for the performance of the Feasibility Study (FS). The field activities for Site 65 were conducted by Baker Environmental, Inc. (Baker) for the DoN from April 1995 through May 1995. This album contains representative site and site activity photographs.

The Remedial Investigation Photograph Album is formatted as follows. Section 1.0 provides an introduction to MCB, Camp Lejeune and the purpose and format of the photograph album. Section 2.0 provides a brief overview of the site and site history. Section 3.0 provides descriptions of specific investigations (i.e., soil investigation, groundwater investigation) conducted at Site 65. Photographs from the site are provided for Sections 2.0 and 3.0.

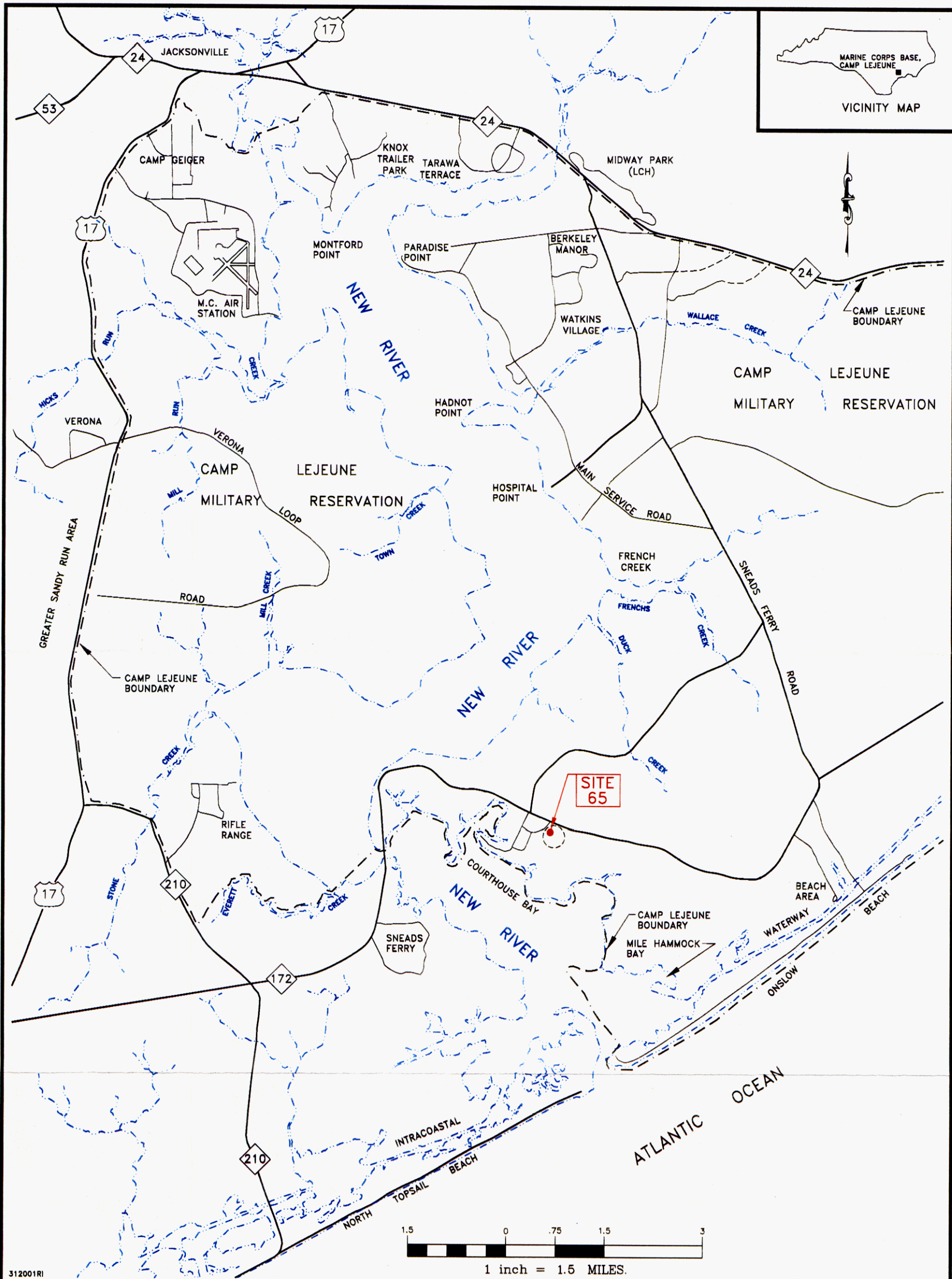


FIGURE 1-1
LOCATION MAP FOR
SITE 65 - ENGINEER AREA DUMP AND
CTO-0312

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

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2.0 SITE CHARACTERISTICS

2.1 Site Location and Setting

The Engineer Area Dump (Site 65) refers to a four to five acre former land disposal site situated in the Courthouse Bay section of MCB, Camp Lejeune (see Figure 1-1). Courthouse Bay is located on the northeastern shore of the New River and south of Sneads Ferry Road (State Route 172). It is on one of a series of small bays which are part of the New River estuary.

Site 65 is primarily a wooded area located east of the Marine Corps Engineer School which occupies property between Site 65 and the bay. The school is used for maintenance, storage, and operator training of amphibious vehicles and heavy construction equipment. The school also utilizes a several-acre parcel located within Site 65 to conduct heavy equipment training activities.

Site 65 is situated in a topographically high area that slopes gently to the south/southeast with an average elevation of approximately 40 feet above mean sea level (msl). Stormwater runoff tends to drain radially to the east, south, and west, away from the site, or collect in local surface depressions. The equipment training area, which occupies the area just east of Site 65, physically separates the site from two small ponds located to the southeast. Portions of the area surrounding the ponds are marshy.

2.2 Site History

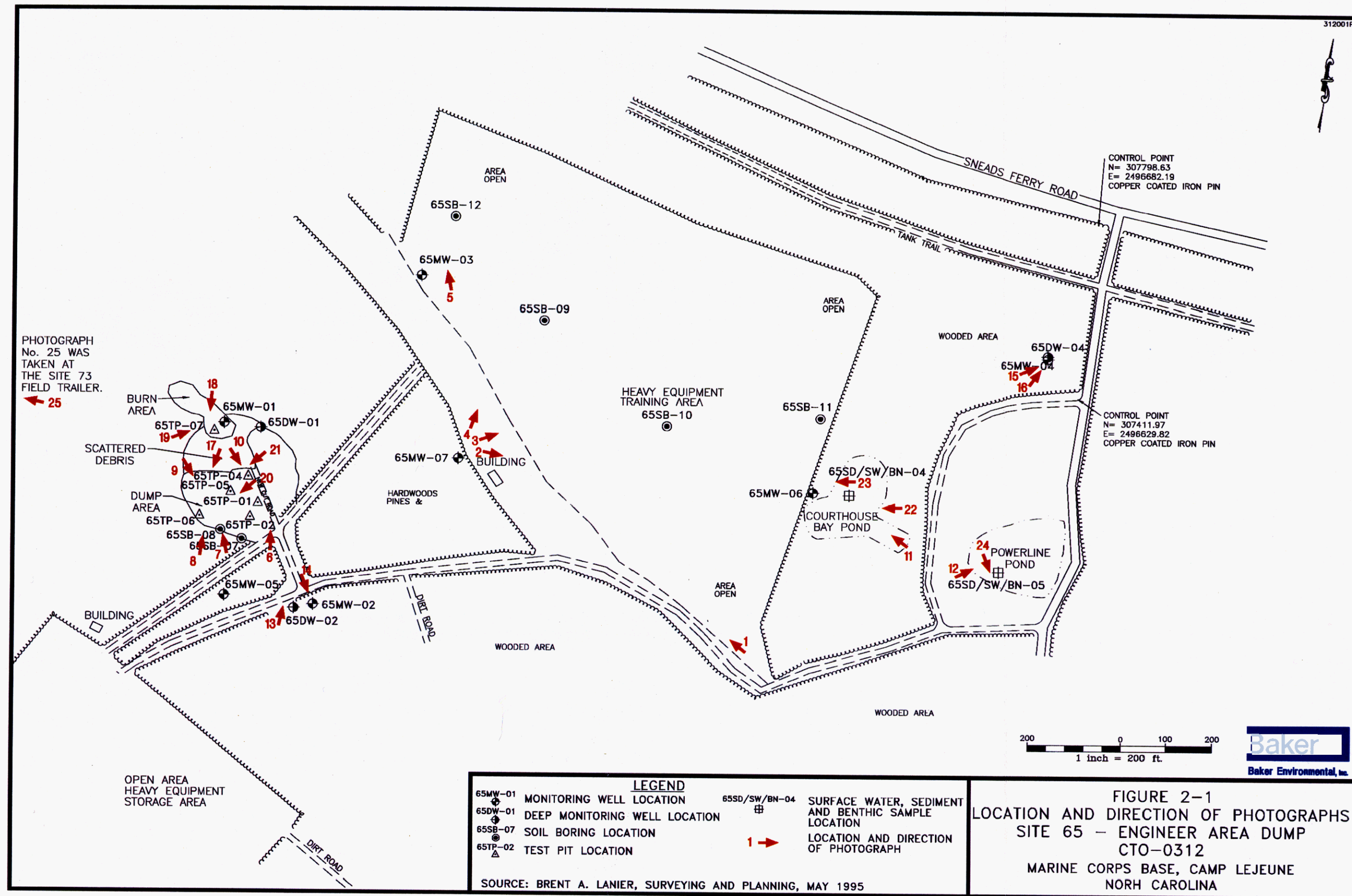
Site 65 reportedly operated from 1952 to 1972. Two separate disposal areas have been reported including: (1) a battery acid disposal area and (2) a liquids disposal area. There are no maps or figures which depict the location of the disposal areas, and neither area is currently discernible due to heavy overgrowth. In addition, Camp Lejeune base maps, available via Computer-Aided Design Drafting (CADD), indicate the location of a burn area which was identified as part of Site 65 under the Initial Assessment Study (IAS) by Water and Air Research (WAR, 1983). Like the disposal area, the location of the burn area is not currently discernible from the surrounding landscape.

The types of liquids which were reportedly disposed at Site 65 include petroleum, oil, and lubricant products (POL). The IAS did not indicate that hazardous wastes were disposed at Site 65. Site Inspection (SI) Project Plans prepared by NUS Corporation (NUS, May 1991) identify both POL wastes and batteries as having been disposed at Site 65; however, the basis for the inclusion of batteries is not known since no other background report or document references the disposal of batteries at this site.



SITE 65

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OU9.SITE65.1994.1 View facing northwest across the southern edge of the engineers' training area. The small building seen on the left is a classroom and shelter for students of the heavy equipment training school. A potentially contaminated soil pile is in the background. Additional debris piles are located further west of this building.



SITE 65

OU9.SITE65.1995.2:

Panoramic photograph of the engineers' training area. View is facing east towards the entrance to Site 65 off of Sneads Ferry Road. This panorama is continued on the next two pages.





OU9.SITE65.1995.3:

Panoramic photograph continued of the engineers' training area located adjacent to the focus of the Site 65 investigation. This view is facing northeast towards Sneads Ferry Road looking at the center of the training area.

SITE 65



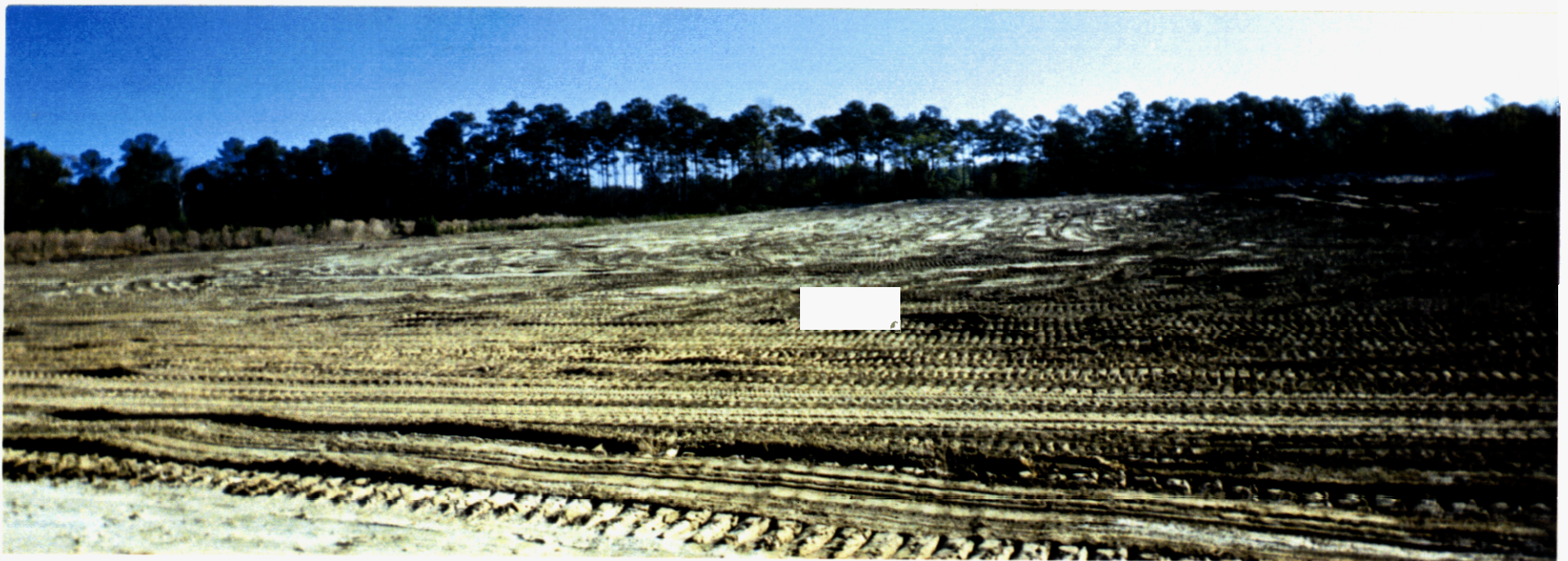


SITE 65

OU9.SITE65.1995.4:

Panoramic photograph continued of the engineers' training area. View facing north.

2-6





OU9.SITE65.1994.5: Photograph of a large soil mound / possible debris pile which existed on the western edge of the heavy equipment training area until its removal by base personnel in April 1995. The mound was located in the northern portion of Site 65. The visible metal debris was also removed from this location. View is facing north/northwest.



SITE 65



OU9.SITE65.1995.6: Photograph facing north up a small trail which leads to the southern-most debris piles and the burn area. This view is from the same location as photograph No.6, but facing in the opposite direction. The debris piles lie to the left of this photograph.



2-9

OU9.SITE65.1995.7:

Panoramic photograph from the heavy equipment trail of the southern-most debris piles. View is facing northwest. Access trail pictured in the previous photograph is to the right of this view.

SITE 65





SITE 65



OU9.SITE65.1995.8: View of the same debris piles looking north. Photograph taken from immediately off of the northern side of the heavy equipment trail.



OU9.SITE65.1995.9: Photograph of metal debris associated with the southern-most debris pile of Site 65. Pictured here are heavily corroded five-gallon pails.



SITE 65



OU9.SITE65.1995.10: Another photograph of metal debris found next to the southern-most debris piles at Site 65. Pictured here is a heavily corroded 55 gallon drum.



OU9.SITE65.1995.11: Photograph of one of the two ponds associated with Site 65. This pond, called Courthouse Bay Pond, is east of the engineers' training area which can be seen in the background of this photograph. The water is very turbid which is the result of runoff from the training area. View is facing west/northwest.



SITE 65



OU9.SITE65.1995.12: Photograph of the second more eastern pond associated with Site 65, named Powerline Pond. This pond is free of the heavy sediments found in Courthouse Bay Pond. View is facing northeast and the access road off of Sneads Ferry Road can be seen in the upper portion of the photograph.

3.0 FIELD INVESTIGATIONS

The following investigations and support activities were conducted at Site 65.

- Surveying
- Soil Investigation
- Groundwater Investigation
- Test Pit Investigations
- Aquatic/Ecological Investigation (including surface water, sediment, fish, and benthic sampling)

Each activity and investigation is described in the following subsections.

3.1 Surveying

This activity involved surveying of current site features including roads, surface water bodies such as ponds and marshes and any significant features which were noted during the site visit. The locations of proposed soil borings, monitoring wells, surface water and sediment sample stations and test pit excavations were established by the survey subcontractor prior to commencing the field program.

Following the completion of the field program, all existing and newly installed monitoring wells, staff gauges, the trench excavations, and any sample locations that were relocated during the field program were surveyed. Survey points included a latitude coordinate, a longitude coordinate, and an elevation expressed in feet of mean sea level. All survey points were referenced to the North Carolina State Plane Coordinate System (NCSPCS).

3.2 Soil Investigation

A soil investigation was conducted at Site 65 to:

- Provide surface and subsurface soil data to evaluate areas of concern identified by the preliminary investigation.
- Determine the nature and extent of soil contamination at the site.
- Support a baseline human health and ecological risk assessment.
- Evaluate possible remedial action alternatives.

The soil investigation involved drilling 13 soil borings. Seven of the borings were completed as shallow or deep groundwater monitoring wells.

The soil borings were drilled to the top of the water table and continuously sampled. Two unsaturated samples were obtained from each boring including one from the surface (0 to 12 inches), and the second from immediately above the water table.

Samples collected from the soil borings (including borings completed as monitoring wells) were analyzed for full Target Compound List (TCL) organics and Target Analyte List (TAL) metals in

accordance with Contract Laboratory Program (CLP) methods. A composite sample was collected from a single soil boring and analyzed for the following engineering parameters: total organic carbon (TOC), alkalinity, chemical oxygen demand (COD), microbial enumeration, total Kjeldahl nitrogen (TKN), total phosphorous, Atterberg Limits, and particle-size distribution.

3.3 Groundwater Investigation

A groundwater investigation was conducted at Site 65 to characterize shallow and deep groundwater zones upgradient, directly beneath, and downgradient of the site. In addition, shallow groundwater was characterized in the area located east of Site 65 and west of the nearby surface ponds. This area, between the ponds and the site, is used almost exclusively for training heavy equipment operators. The data generated from this investigation will be used to determine the nature and extent of groundwater contamination, support a baseline human health and ecological risk assessment, and evaluate remedial alternatives.

The shallow monitoring wells (Type II well construction) were installed to depths ranging from approximately 12 to 23 feet below ground surface (bgs). The well screens for the shallow wells are 10-15 feet in length and intercept the water table. The intermediate wells (Type III well construction) were installed in the upper portion of the Castle Hayne Aquifer. The screen length of the intermediate monitoring wells is 10 feet. Two rounds of groundwater level measurements and a single round of samples were obtained from all site monitoring wells. In situ slug tests were performed in three of the shallow wells to determine shallow aquifer characteristics.

Each newly installed and existing monitoring well was developed during the investigation to establish hydraulic communication between the well and the formation and to remove any fine-grained sediment from the screen. During well development a minimum of five well volumes were removed from each well with either a centrifugal pump (for the shallow wells) or a Waterra pump (for the deep wells), and the well was surge blocked. Pumping continued until the well stabilized (i.e. stable pH, conductivity and temperature; and turbidity < 10 Nephelometric Turbidity Units [NTUs]) or until three hours of pumping had passed.

Low-flow purge and sampling techniques were employed for collection of groundwater samples at the site. The monitoring wells were purged and sampled approximately one week following the development of the wells. Using a peristaltic pump, three to five well volumes were removed at a flow rate of 0.2 to 0.3 gallons per minute (gpm). Upon stabilization of the well, necessary samples were collected.

All samples were analyzed for TCL organics, TAL metals (total) and total suspended solids (TSS) in accordance with CLP methods. In addition, a sample from one well was analyzed for total dissolved solids (TDS), biological oxygen demand (BOD), COD, TKN, TOC, total phosphorous, microbial enumeration, acidity and alkalinity.

3.4 Test Pit Investigations

Six test pits were excavated in the vicinity of the debris piles to investigate the existence and nature of the disposed material. The Test Pit locations were selected based on historical information provided by previous investigations. The trenches were approximately 10 to 15 feet in length and excavated to the top of the groundwater surface or to a depth of 10 feet. Notes were made of any

debris encountered in the test pits, and a log of the soils within the trench was prepared. Level B protection was implemented during excavation and sample collection activities.

Composite soil samples were collected from each of the test pits and submitted to the laboratory. The samples were analyzed for TCL organics and TAL metals in accordance with CLP methods. In addition, each sample was analyzed for total petroleum hydrocarbons (TPH) via EPA Methods 8015 (California GC-FID) and 3550/5030 (sample preparation).

3.5 Aquatic/Ecological Investigation

An Aquatic/Ecological Investigation was conducted in the two ponds to the east/southeast of Site 65. Surface water, sediment, fish and benthic macroinvertebrates were collected from the two ponds identified as the Courthouse Bay Pond (the westernmost pond) and Powerline Pond (the easternmost pond).

Surface water samples were collected from the approximate mid-vertical point in the pond using a subsurface grab sampler. The sediment sampling was accomplished using a decontaminated stainless steel sediment corer fitted with a new disposable plastic liner and decontaminated plastic nosecone. Upon extruding the sample into a clean aluminum foil pie pan, the required amount of sediment needed for volatile analyses was removed with a clean stainless steel spoon and placed in the appropriate containers. The remaining sediment was homogenized and transferred into their respective sample jars.

Benthic macroinvertebrate samples were collected from the Baker boat using a standard ponar grab sampler.

Fish were collected in Powerline Pond via electrofishing. Hoop nets were utilized in both ponds. Minnow traps baited with cat food also were deployed, however, no minnows were collected in these traps.

All surface water, sediment and fish samples were collected for TCL organics and TAL metals in accordance with CLP methods. Sediment samples were collected for TPH in addition to the previously stated analyses.



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3-5

OU9.SITE65.1995.13:

Panoramic photograph of Baker and drilling subcontractor personnel installing deep monitoring well 65DW-02 with the truck mounted CME 75 drill rig. The white Baker field vehicle is situated facing west/southwest along the southern heavy equipment trail leading through Site 65 towards Courthouse Bay and the Engineering School. The photograph is taken facing north.

SOIL INVESTIGATION



026224R2V



GROUNDWATER INVESTIGATION



OU9.SITE65.1994.14: Photograph of the existing monitoring well, 65MW-02, which was installed during a previous investigation. This well is located next to well 65DW-02 which is pictured being installed during the remedial investigation performed in Spring 1995 in the previous photograph, No. 14. View is facing east/southeast.

GROUNDWATER INVESTIGATION



OU9.SITE65.1995.15:

Photograph of Baker personnel in the process of sampling a monitoring well. Pictured here taking measurements of groundwater pH, specific conductivity, temperature, and turbidity to determine well stability before sampling.



OU9.SITE65.1995.16:

Photograph of Baker personnel filling out sample bottle labels just prior to sampling a groundwater monitoring well.



TEST PIT INVESTIGATIONS



OU9.SITE65.1995.17: Photograph of Baker personnel in Level B during test pit operations at 65TP-05, located adjacent to the main debris piles at Site 65. Baker personnel pictured just prior to re-entering the hot zone. The Ford 555D is seen set up on 65TP-05 in the background. View facing approximately southwest.

TEST PIT INVESTIGATIONS



OU9.SITE65.1995.18: Photograph of drilling subcontractor personnel excavating a test pit in the burn area, 65TP-07, using a FORD 555D backhoe. Backhoe operator is seen wearing Level B protective equipment with his air tank secured in the cab space of the backhoe. View is facing southeast.



TEST PIT INVESTIGATIONS



OU9.SITE65.1995.19: Another photograph of drilling subcontractor personnel excavating a test pit in the burn area, 65TP-07. Test pits were excavated to a depth of ten feet or until intercepting the groundwater table, whichever came first. View is facing approximately north with the previously existing monitoring well 65MW-01 visible to the right of the backhoe.

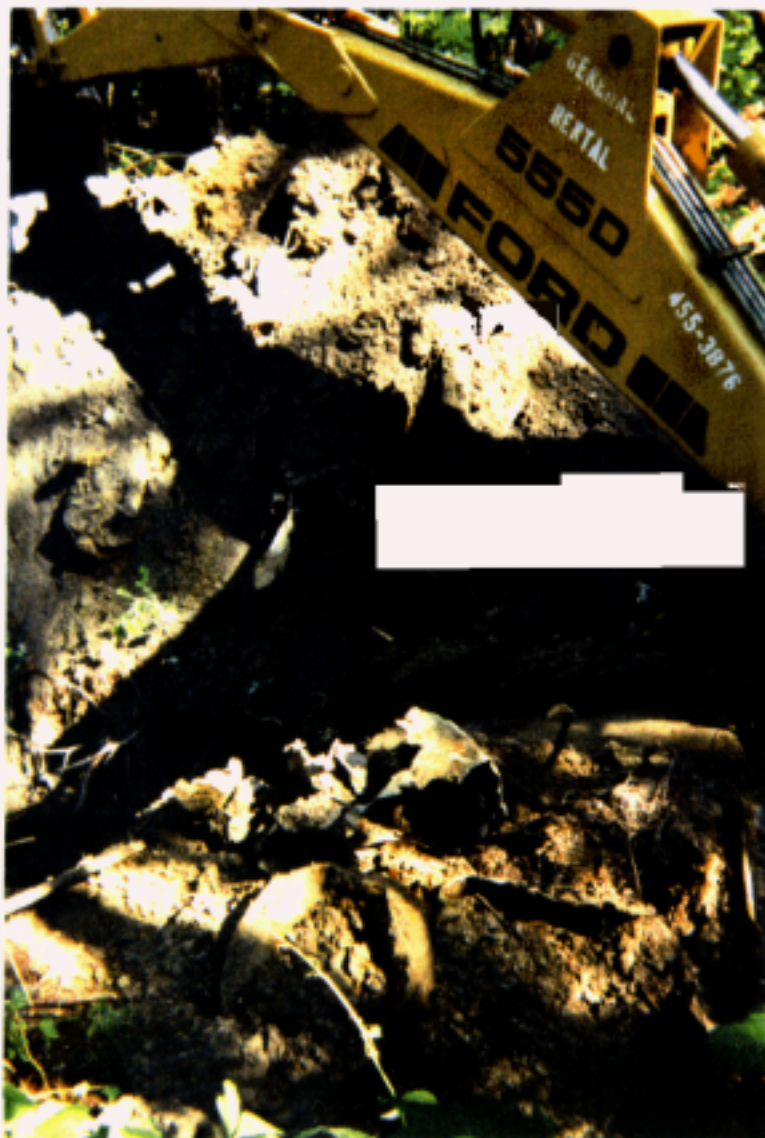
**TEST PIT
INVESTIGATIONS**



OU9.SITE65.1995.20: Photograph looking down at a completed test pit, 65TP-05. View is facing approximately southwest.



TEST PIT INVESTIGATIONS



OU9.SITE65.1995.21: Photograph of test pit 65TP-04, adjacent to one of the southern-most debris piles at Site 65. Various highly corroded metal debris was encountered during excavation activities as pictured here. View is facing in a southerly direction.

**AQUATIC/ECOLOGICAL
INVESTIGATION**



OU9.SITE65.1995.22;

Photograph of Baker personnel lowering the Baker boat into Courthouse Bay Pond, just east of the engineers' training area. View is facing west towards the training area.



OU9.SITE65.1995.23;

Photograph of Baker personnel setting a hoop net in Courthouse Bay Pond. Note the turbid, sediment rich water.



AQUATIC/ECOLOGICAL INVESTIGATION



OU9.SITE65.1995.24: Photograph of Baker personnel preparing to set a hoop net in Powerline Pond. Picture taken from Baker boat.



OU9.SITE65.1995.25: Photograph of fish samples caught in Courthouse Bay Pond. Pictured are redear sunfish.

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